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Classes of Invariant Subspaces for Some Operator Algebras

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Abstract

© 2013, Springer Science+Business Media New York. New results showing connections between structural properties of von Neumann algebras and order theoretic properties of structures of invariant subspaces given by them are proved. We show that for any properly infinite von Neumann algebra M there is an affiliated subspace ${\mathcal{L}} $ such that all important subspace classes living on ${\mathcal{L}} $ are different. Moreover, we show that ${\mathcal{L}} $ can be chosen such that the set of σ-additive measures on subspace classes of ${\mathcal{L}} $ are empty. We generalize measure theoretic criterion on completeness of inner product spaces to affiliated subspaces corresponding to Type I factor with finite dimensional commutant. We summarize hitherto known results in this area, discuss their importance for mathematical foundations of quantum theory, and outline perspectives of further research.

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Keywords

affiliated subspaces, measures on subspace structures, von Neumann algebras